

cooperation, the levy on the individual participators would be very small indeed.

There are in my opinion three points in the Arctic seas which offer, I believe, special advantages as bases for penetrating towards the Pole, and on which particular attention should be concentrated, viz. the north of Spitzbergen, the north-east of Novaya Zemlya, and the Behring Straits.

To the north of Spitzbergen, *i.e.* to the north of the Seven Islands, Norwegian hunters have, in the autumn of certain years, found the sea to the north and north-east so free from ice that they have deemed it a very easy matter to have penetrated with a steamer considerably northwards. Such was, for instance, the state of the ice in the autumn of 1881. And similarly the sea to the north-east of Novaya Zemlya has in certain years been easy of navigation, and finally, judging by researches, it may be assumed that the same is the case with the sea north of the Behring Straits.

Now, in order to carry out the programme which I have here suggested for a more systematic research of the Polar regions, I advocate that four small but excellent steamers should be provided, of which one should every year be despatched to a station on the north coast of Spitzbergen, another to one at the northern point of Novaya Zemlya, and the remaining two to respective stations north of the Behring Straits. This should be carried out during eleven consecutive years. Then when the state of the ice in certain seasons was very favourable, the vessels should take advantage of the opportunity and proceed northwards.

The advantage of this plan is that it would be attended with very little risk, while the object should be not to attempt to force an advance, but rather to wait patiently until the favourable opportunity presents itself, and then to act with boldness and decision. There is on the other hand every reason to assume that the time of the members of these expeditions would be employed throughout in a way beneficial to science. As a matter of safety it would also be advisable to establish fixed stations or depots in suitable places, to which the expeditions could resort in case of need.

From the experience we have gained of late it may be safely assumed that the Polar basin is not during any whole summer or autumn covered with continuous ice; it is in fact evident that the sea shows large tracts of open water during these seasons. The ocean ice north of Spitzbergen is thus always in a constant—at times even exceedingly violent—state of drifting in the most varied directions, according to the currents and winds prevailing. At times, too, the ice has been found to drift in a direction contrary to those of currents and winds. North of Spitzbergen there must, therefore, during certain periods of the season be large tracts of open water which are capable of receiving the enormous ice masses in drift.

As is generally known, Petermann advanced the hypothesis that Greenland extended in a more or less broad belt of land towards the Pole, from whence it diverged downwards to Behring Straits. If this is so, the great Polar basin should be divided into two parts with a common outlet into Behring Straits, although distinctly separated from each other by the land belt in question. They would at the other end discharge themselves into two different channels, viz. one in Baffin's Bay and the other in the Greenland and East-Spitzbergen ocean. This hypothesis has been supported by many eminent *savants*, as for instance Parpart, Jäger, and Chavanne.

Without, however, disputing the correctness of the reasons for this assumption, it would not be difficult to point out circumstances which would refute the hypothesis. And although several things seem to corroborate the assumption that the real Polar basin contains a belt of smaller and larger islands, it is perfectly obvious that

the climatological and consequently the glacial conditions of these regions would have been quite different from those now prevailing had a large continent of the kind described by Petermann occupied the greater portion of the central Polar basin. I myself believe, judging by the strong motions of the ice north of Spitzbergen and Novaya Zemlya, and certain circumstances attending the same, that the climate of the Polar regions is a sea or insular climate rather than a continental one. In making this assertion, however, I do not say that a continent such as that referred to has not existed there in the Tertiary or early part of the Quaternary period.

However this may be, the question to be solved is one of preeminent importance to men of science, and I feel certain that a mode of research effected in the manner I have here advocated would certainly result in its solution.

KARL PETTERSEN

Tromsø Museum, July

NOTES

A MEETING of the General Committee of the International Fisheries Exhibition was held at South Kensington on Tuesday. Mr. Birkbeck presided, and read the Report of the Executive Committee, which stated that the number of visitors to the Exhibition has, up to the present, been very large. The numbers up to Saturday, the 25th inst., were 1,444,515, showing a daily average of 16,050. The juries have, with few exceptions, now completed their labours, and their reports will be laid before the Special Commissioners, appointed by Her Majesty's Government, for consideration and approval. The Report closes as follows:—"With regard to the future, it is indispensable that the Executive Committee should obtain the necessary powers from the General Committee to announce the closing of the Exhibition on some day to be fixed hereafter, and that they should further be invested with authority to carry out any negotiations and make any agreements they may deem necessary for the subsequent utilisation of the buildings, which have been erected at so great a cost, in order that a fair proportion of the money that has been expended upon them may be recovered. In furtherance of the latter object, the Executive Committee have much pleasure in stating that they have received from Her Majesty's Commissioners of 1851 an intimation that, provided the grounds are used solely for the purposes of holding exhibitions, they would be willing to extend the existing agreement (which expires on December 31 next) for a further period of three years. The Executive Committee have every reason to believe that, with the approval of the Prince of Wales, exhibitions of great importance will be held in each of these years. Under these arrangements the authorities, which His Royal Highness may be pleased to constitute for carrying out each of these exhibitions, will become tenants of the Fisheries Exhibition, and would accordingly pay a proportion of the original cost as rent for the use of the buildings. The Chairman said it was a matter of congratulation that the numbers admitted had proved to exceed the most sanguine expectations of the general public, and the Committee had every reason to believe that for the future, especially during the month of September, large numbers of visitors would attend. The most important portion of the Report referred to the future use of the buildings. Next year it was proposed to hold a great international exhibition of horticulture, floriculture, and forestry, and they had every reason to believe it would be successful. There had been some question of the conferences being continued later on. The discussion on the paper by the Duke of Edinburgh was adjourned *sine die*, and probably, if His Royal Highness was in London at the end of September or the beginning of October, he might be disposed to attend. There was also another promise given that there should be a fishermen's

congress, which it was proposed should be held at the end of September. The only other matter was with reference to the juries. The reports had nearly all come in, and they had only now to wait for the meeting of the Government and Special Commissioners to confirm the various awards.

ON the occasion of the unveiling of the statue of Daguerre at Cormeilles on Sunday, it was stated that the family is not extinct, the present representative being M. Behon-Daguerre, a contributor to French scientific journals. It was on August 19, 1839, that the Daguerreotype was publicly exhibited by Arago at a sitting of the Academy of Sciences. This communication was made in accordance with the provisions of a law granting to Daguerre and Niepce a joint annuity of 400*l.* for the purchase of their invention on behalf of the French nation. Of the members of the Academy sitting on August 19, 1839, only two are now alive—M. Dumas, the Perpetual Secretary, and M. Chevreul, who was then in the chair. It was M. Chevreul who congratulated M. Daguerre in the name of the Academy of Sciences.

AN excellent paper taken from an address delivered to secondary school teachers in Switzerland has been circulated by the U.S. Education Bureau to answer the question, How to teach natural science. It urges that knowing facts is not the object of such education; in that case a supply of works of reference would be a royal road. "One gets on faster with a child by carrying it, but it is for the child's interest to teach it to run and swim by itself." A teacher, therefore (who must be laboriously grounded himself), must patiently bring *all* his scholars, not the most promising only, to discover and observe facts for themselves—teach them to *see*. Cram is most dangerous in scientific teaching, because most easy to both of them. Books, therefore, should be little used, and nothing about an object should be taught without such object before them. After *seeing*, the next lesson is *describing*, with the help of drawing if possible, both leading to accuracy in the use of language. Plants first, which are plentiful for experiments, then animals of different classes; later on minerals should be chosen, mechanical effects on these latter first, later on chemical. The district museum of natural history and such classes would mutually assist each other greatly; in fact neither, to be successful, would long go on without the other. And, indeed, the lecturer wisely cautioned his hearers that making collections must not become a rage with the pupils.

M. PASTEUR has addressed a telegram to M. Dumas, Perpetual Secretary of the Academy of Sciences, to inform him that he has received telegraphic news from the French Mission which has gone to Egypt to study the cholera. M. Pasteur says that it contains very curious observations of a highly novel character.

THE Royal Commissioners on Technical Instruction are now engaged in preparing their Report, which promises to be a work of considerable magnitude. The completion of it will probably occupy more time than was originally contemplated.

PROF. W. M. HICKS, M.A., has been appointed Principal of Firth College, Sheffield, in the room of Prof. Jones, the newly-appointed Principal of the South Wales College. Mr. Hicks is a Fellow of St. John's College, Cambridge, and was seventh Wrangler in 1873. He worked in the Cavendish Library under the late Prof. Maxwell.

IN addition to the observations carried on around the Pole the physical institution at Upsala has also carried out others in that place during the winter, which were brought to a close on August 15 last.

WE have received from the President of the University of Tokio the Calendar of the Departments of Law, Science, and Literature for the session 1881-82. Like the Report of the Japanese Department of Education, this volume comes somewhat

late. As is the case with all the Japanese educational establishments, we notice here the rapid reduction in the number of foreign teachers, and the increase in the number of qualified natives who take their places. Thus in the department of science we find thirty-six instructors of various grades, of whom only seven are foreigners, and there have recently been still further reductions. Many of the native professors appear to have excellent academical degrees from European and American universities, and one is a Cambridge Wrangler. Among the changes in the curriculum during the session we observe that the permission to students to choose between the study of French and German is taken away, and the latter language made compulsory. "This change has been made in order to enable students to pursue their studies or professions in future to the best advantage, since it is believed that Germany is the country where the sciences here pursued have reached the highest comparative development." Several graduates were despatched during the year to Europe to continue the study of zoology, mechanical engineering, medicine, and political science. The total number of students was 170, 91 of whom had entered for the scientific course; while the total number of graduates was 133.

THE new biological laboratory of the Johns Hopkins University, which will be opened next September, has, *Science* states, been especially constructed with reference to providing opportunity for advanced work in experimental physiology. It contains two large rooms for general advanced work in animal physiology, in addition to others specially designed for work with the spectroscope, with the myograph, for electro-physiological researches, and for physiological chemistry. It also contains a special room constructed for advanced histological work, and well supplied with apparatus and reagents, a room for micro-photography, and rooms for advanced work in animal morphology.

A TELEGRAM from Batavia, dated August 27, states that terrific detonations from the volcanic island of Krakatoa were heard on the previous night, and were audible as far as Soerakarta, showers of ashes falling as far as Cheribon. The flashes from the volcano were plainly visible from Batavia. Serang is now in total darkness. Stones have fallen at that place. Batavia was also nearly in darkness. All the gaslights were extinguished during the night. It was impossible to communicate with Anjer, and it is feared that some calamity has happened there. Several bridges between Anjer and Serang have been destroyed, and a village near the former place has been washed away, the rivers having overflowed through the rush of the sea inland. This rush is spoken of in the telegrams as a "tidal wave," but it is evidently more of the nature of an earthquake wave, a phenomenon so well known on the west coast of South America. Java is the centre of one of the most active volcanic regions on the globe; it has about sixteen active volcanoes, and many more which are mostly quiescent, not extinct.

A TERRIBLE tornado broke over the south-eastern part of Minnesota on August 22. At Rochester forty persons are reported to have been killed and fifty injured. A third of Rochester is stated to be wrecked, and it is feared that the whole country around that town is in ruins. The number of killed is estimated at some hundreds. A passenger train on the Rochester and Northern Railway was blown off the line, and it is reported that twenty-five passengers were killed and thirty-five injured. The storm also visited Utica, St. Charles, and neighbouring counties.

ON August 5 at about 9 p.m. a very fine meteor was observed from several places around Lake Vettern, in Sweden. It passed across the sky from west to east, and possessed a magnificent lustrous head and tail somewhat resembling a large rocket. Its speed was as slow as that of the latter, its passage

occupying exactly two minutes, while it left a shining track for several seconds in the sky. On August 12 at about 9 p.m. a meteor was seen at Sarpsborg, in Norway. It represented a fireball with a long shining tail, passing in a straight line across the sky in an easterly direction. It was in view for about one minute.

A SHOCK of earthquake of a rather severe nature, but of short duration, was felt at Agram at 3.40 p.m. on the 28th inst. It was accompanied by subterranean rumblings.

M. JACQUELAIN has endeavoured to prepare a pure carbon for electric purposes that should be as hard and as conductive as gas carbon. He first takes gas carbon, which he submits to four processes: (1) treatment with dry chlorine at a red heat for thirty hours; (2) treatment with hot alkali for about three hours; (3) immersion in hydrofluoric acid (1 to 2 of water) at a temperature of 15° to 25° ; (4) carbonised by heating strongly in the vapour of a high-boiling hydrocarbon, for commercial purposes gas tar will do well. All these operations may be performed after the carbon has been cut into sticks. By these processes the impurities have been reduced to a minimum and a good, pure carbon obtained.

THE director of the Jardin d'Acclimation of Paris has just received an entire tribe of Kalmucks from the desert lands in the neighbourhood of the Caspian Sea. It consists of 9 men, 8 women, 4 girls and children, 18 camels, 15 mares and young horses, 10 Kirghiz sheep, with tents, instruments, arms, &c. They will probably visit London after having made in Paris a stay proportionate to their success.

ON Sunday week an extraordinary ascent was made at Nogent-sur-Marne. The aéronaut ascended at 4.30 p.m., and landed near St. Cloud on the following day at 7 a.m. He remained $14\frac{1}{2}$ hours in the air, and travelled no more than 30 kilometres.

M. FRIEDEL has found that at certain temperatures blende, chloride of sodium, and boracite exhibit pyroelectric phenomena. Boracite he found to be so most markedly at the point when it lost its cubical form whilst cooling after being heated to 265° .

MESSRS. LONGMANS AND CO. have issued the eleventh edition of Prof. Atkinson's translation of Ganot's "Elementary Treatise on Physics." About thirty-two pages have been added to the new edition, while the chapter on the steam-engine has been entirely recast.

MR. FISHER UNWIN has added to his useful series of Half-Holiday Handbooks a Guide to Wimbledon, Putney, and Barnes. The same publisher also sends us a little Handbook to the Fernery and Aquarium.

M. DE FONVIELLE asks us to say that by mistake he stated in his note on the Montgolfier statue that it was cast in bronze; it is in plaster, and the cast is being executed.

THE additions to the Zoological Society's Gardens during the past week include a Maholi Galago (*Galago maholi*), purchased; a Vervet Monkey (*Cercopithecus lalandii*), presented by Mr. J. H. Sheppard; two Golden Eagles (*Aquila chrysaetos*) from Scotland, presented by Mr. A. H. Browne; two Short-toed Eagles (*Circus gulficus*), purchased; a Yellow-headed Cuckoo (*Conurus jendaya*), presented by Her Grace the Duchess of Wellington; a Slender-billed Cockatoo (*Licmetis tenuirostris*), presented by Mr. R. Keele; a Land Rail (*Crex pratensis*), presented by Mr. M. Bryant; a Partridge Bronze-winged Pigeon (*Geophaps scripta*), and a Modest Grass Finch (*Amadina modesta*), presented by Mrs. J. Abrahams; a Martinique Waterhen (*Porphyrio martinicus*), a Mississippi Alligator (*Alligator mississippiensis*), presented by Mr. Cuthbert Johnson; six Chameleons (*Chamaeleon vulgaris*), purchased; a Hog-nosed Snake (*Heterodon platyrhinos*), presented by Mr. F. J. Thompson.

OUR ASTRONOMICAL COLUMN

THE DIVISION OF BIELA'S COMET.—Those who have made themselves acquainted with Hubbard's masterly researches on the motion of Biela's comet will be aware that he arrived at the conclusion that the disruption of the comet, by whatever cause effected, took place in heliocentric longitude $318^{\circ}6'$, and latitude $+12^{\circ}0'$, distance $4'36''$, which position he states the comet occupied in November, 1844. In fact, if we adopt Hubbard's final elements for perihelion passage in February, 1846, we find for 1844, November 16.0 G.M.T., longitude $318^{\circ}36'$, latitude $+12^{\circ}2'$, radius-vector $4'3665''$, and the true anomaly $209^{\circ}57'$. At the time when Hubbard's investigation was made, no one of the known minor planets attained this distance from the sun. We are now acquainted with several which recede further, towards aphelion passage, and an encounter between the comet and a small planet might explain the phenomenon which occasioned so much astonishment in 1845-46. The orbits of some 230 of these bodies have been calculated, but on submitting them to examination with a view to discover whether any one of the planets could pass through the point indicated by Hubbard as that of the separation of Biela's comet, we arrive at a negative result. *Andromache* recedes to a distance of $4'723''$ from the sun, *Ismene* to $4'590''$, and *Hilda* to $4'632''$, but at such distances all three are much nearer to the plane of the ecliptic than Hubbard's position. We may therefore say that if the Biela catastrophe was occasioned by collision with a small planet, it was not one of the large number already calculated.

VARIABLE STARS.—Mr. Knott has succeeded this year in following the variable S Virginis almost if not quite to a minimum, but unfortunately the long twilight, moonlight, and hazy and cloudy skies in July preventing him from fixing the exact date. On April 4 the star was 9^m , and ruddy; April 25, $10^m15''$; May 4, gauged $11^m5''$; May 31, $12^m1''$; June 25 and 28, $12^m2''$ and $12^m3''$; June 30, $12^m7''$; and on July 4, by a doubtful observation, $12^m75''$. The observations made by Mr. Hind, soon after the discovery of the star's variability in 1852, compared with those of Prof. Schönfeld to 1875, give the following elements;—

	Days.
Minimum	1875, April 27.4 + 373.77 E.
Maximum	1866, June 7.15 ..

This formula assigns July 4, 1883, for minimum, a date closely borne out by Mr. Knott's observations, and for next maximum, 1883, October 30, not observable.

The star varies from about 5^m to $12^m7''$. It is XIII. 420 of Weiss's Bessel, and its position for 1884.0 is in R.A. $13^h26^m56^s.9s$, N.P.D. $96^{\circ}35'46''$.

Mr. Knott has also found a maximum of R Scorpii on 1883, July 9, magnitude $10^m1''$. S Scorpii had already passed maximum when the observations commenced in the middle of May.

THE GREAT COMET OF 1882.—It may be hoped that one or more of the larger instruments in our observatories will be employed in a further attempt to fix positions of this remarkable body during the absence of moonlight in September. Positions were given in NATURE, vol. xxviii. p. 334, and will also be found in the *Astronomische Nachrichten*.

Now that the period of revolution resulting from the most reliable calculations approximates to eight centuries, it would be interesting to bring together in their original form the numerous descriptions of the great comet of 1106, the substance of which is given by Pingré, more especially the references to the direction of the tail (between the east and north) in the latter part of the comet's appearance. Like the comet of 1882 it was seen close to the sun; one historian says it was so observed from the third to the ninth hour of the day on February 4.

GEOGRAPHICAL NOTES

WITH reference to the Austrian Meteorological Expedition which on Tuesday last arrived in Vienna from Jan Mayen, we are now able to give the following particulars of the wintering at the island. Leaving Iceland on August 1 the *Pola* sighted the southern point of Jan Mayen on the 3rd, but a thick fog prevented landing until the following day. Lieut. von Wolgemuth, with some officers, at once came on board, and great were the rejoicings on both sides at the meeting. The chief of the expedition states that at the end of August, 1882, the northern storms began with a heavy fall of snow. September was, how-